Long Range Sensors

– AN/TPS-59(V)3

– 3D Expeditionary Long Range Radar

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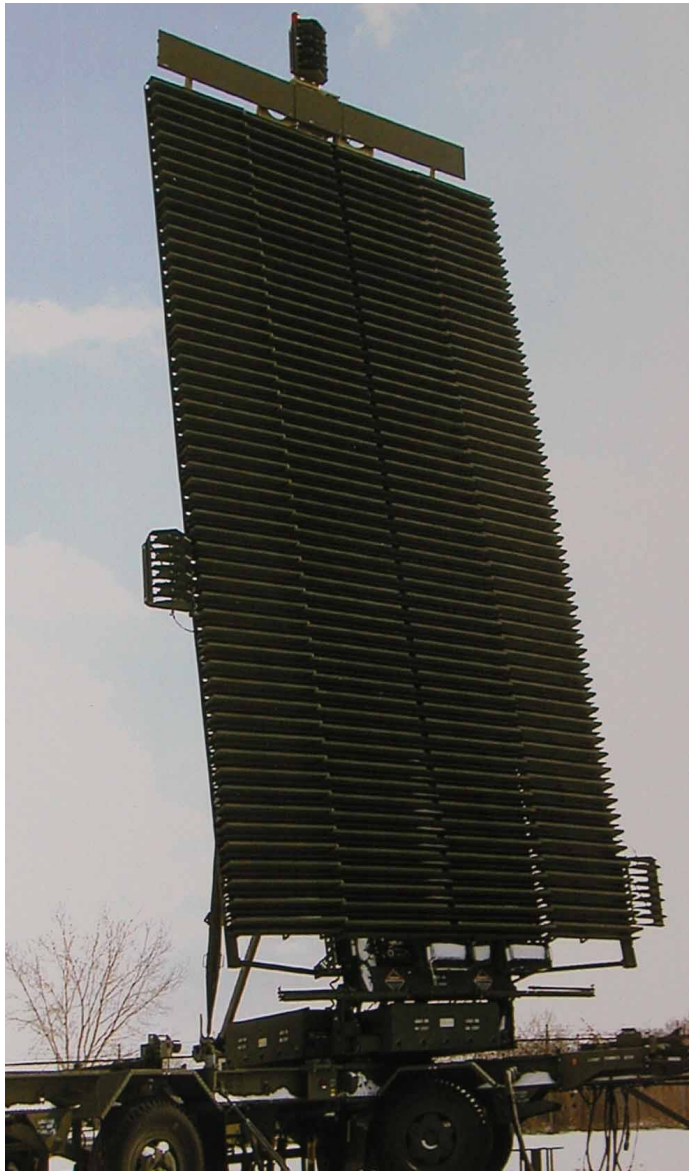
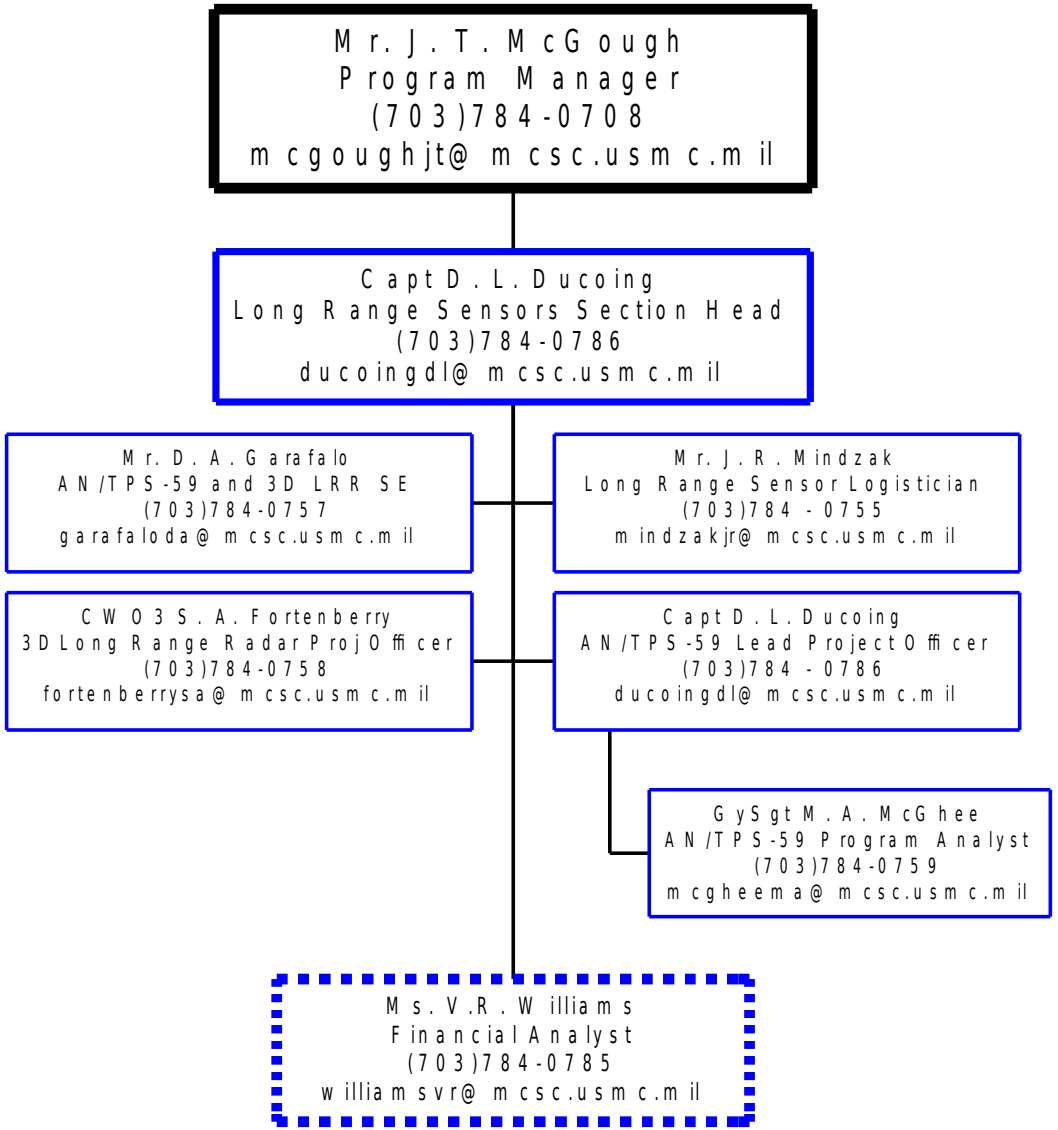


Long Range Sensors
Agenda

- Program Management Team
- Significant Recent Accomplishments
- Efforts in Progress
- Road Ahead
- Questions

Long Range Sensors Program Management Team



Long Range Sensors Significant Recent Accomplishments

- **ECP's completed**
  - TAOM (V)4 upgrade
  - Discrete Interface Board (DIB) replacement
  - MAPS (Phase II)
  - IETM
  - New Transmitter
- **AN/UPX-37 Digital Interrogator**
- **AN/TPS-59(V)3 RADAR Maintenance Handbook (MCTSSA)**
- **Exercise Support of forward deployed units**
- **Program Objective Memorandum (POM) 04**

Significant Recent Accomplishments (continued)

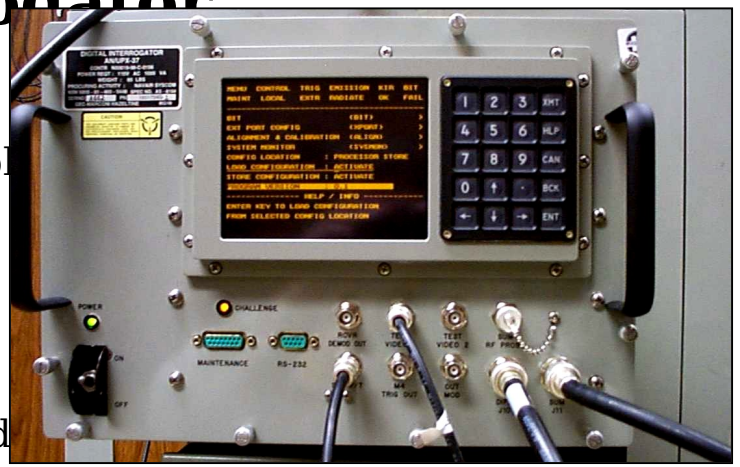
- **TAOM (AN/TYQ-23(V)4) Modification Kit**
  - Software and Hardware Engineering Change Proposal complete
  - Mod kits have been delivered
- **Discrete Interface Board (DIB)**
  - ECP Complete
  - Round Robin in process
- **Interactive Electronic Technical Manuals (IETMs)**
  - Latest version reviewed 23 July 02 - Approved
  - Projected shipment in August 02
- **New Transmitter**
  - ECP approved
    - Albany making buy, approx. 100 / MCSC making buy of 20-30*
  - Combined PreDriver/Driver

Significant Recent Accomplishments (continued)

- **Modular Azimuth Positioning System (MAPS)**
  - Replaces existing North Finding Module, significantly decreasing northing process and improves accuracy.
    - Northing process reduced to approximately 10 minutes
    - Accuracy improved to 2 mils requirement (actual value during testing was .2 mils)
  - Accomplishments
    - All units have been received at LMC Syracuse and tested
    - Cable manufacturing near completion
    - Three units currently fielded
  - *Phase III*
    - Automatic north finding
    - Dynamic tilt sensing

Significant Recent Accomplishments (continued)

- **AN/UPX-37 Digital Interrogator**



  - Replaces existing AN/UPX-27
    - Mode 5 and Mode S capable/upgradeabl
    - MTBF = 5066 hours
    - MTTR= 19 minutes
  - Accomplishments
    - Total procurement = 44 units (fully fund
      - Nine sets of spares procured (each unit will have a set of spares)
    - Six units in place within the FMF
    - Utilizing Navy's Performance Based Logistics (PBL) program for repair
  - Fielding schedule
    - Initial training completed for MACS-24, MCTSSA and MCCES
    - Testing near completion at Lockheed Martin Corp.
    - ULSS currently being reviewed
    - Final testing will be completed at MCTSSA
    - TM development - NSWC Crane

AN/UPX-37
Digital Interrogator

Fielding Plan

Distribution of UPX-37's	UPX-37	Spare	Sp Pck	Fielding Date FY03	Fielding order	O/H*	Auth O/H
MACS-1 TAOC (Yuma)	2	1	1	31-Jul	3		3
MACS-1 EW/C (Mirimar)	1	1	1	31-Jul	4		2
MACS-2 TAOC (CP)	2	1	1	31-Jul	5	1	3
MACS-2 EW/C (Buef)	1	1	1	31-Jul	6	1	2
MACS-4	3	1	1	30-Jun	2	1	4
MACS-23	2	1	1	31-Aug	7		3
MACS-24	2	1	1	31-Aug	8	1	3
MCCES Maint	3	0	1	31-Aug	10		3
MCCES	12	3	0	31-May / 30-Jun	1		15
MCTSSA	2	1	1	31-Aug	9	1	3
DEPOT	1	1	0	30-Sep	11		2
LMC	1	0	0	N/A	12	1	1
Total	32	12	9			6	44

* Note - these units are on a temp loan basis for evaluation and testing only

Spares Package

PART NUMBER	NOMENCLATURE
1001748G-2	MICROPROCESSOR
1001736G-3	CCA CODER TIMING
1001735G-2	CCA DVP DEFRUITER
1001738G-2	POWER SUPPLY
1001741G-2	RCVR-MOD MODULE
1001740G-2	TRANSMITTER ASSY
1001747G-2	RF I/O MODULE ASSY
1001947P-2	DATA ENTRY DEVICE
AP-16-1-62-153	CIRCUIT BREAKER

Significant Recent Accomplishments (continued)

- **AN/TPS-59 RADAR Maintenance Handbook**
  - MCTSSA development
  - Complete 6 May 2002, 1st Edition
  - Nine Chapters
    1) Specification & Characteristics
    2) Siting Considerations
    3) Embarkation
    4) Operator Controls
    5) Support Equipment
    6) Radar Operations
    7) Other Information
    8) Maintenance
    9) Radar Environment Simulator

- **Exercise Support of forward deployed units**
  - MAPS's
  - AN/UPX-37's
  - Recording capability
  - Supply support
  - Manual FAR

Efforts in Progress

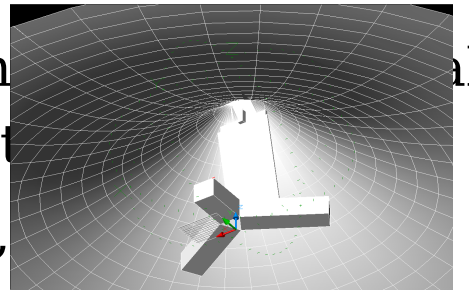
- ***Modular Azimuth Positioning System (MAPS Phase III)***
- ***Maintenance Lift Replacement***
- ***IFF Antenna Replacement (GPA 123 replacement)***
- ***Composite Track Network (CTN/CEC)***
- ***False Alarm Reduction (FAR) (Manual FAR)***
- ***Post Detection Processor upgrade (Nighthawk to Powerhawk 720 PC)***
- ***Precision Lightweight Global Positioning System Receiver (PLGR) Replacement***
- ***Mission Planner***
- ***Low Earth Orbit Satellites (LEOS) (Data Registration)***
- ***Radar Environmental Simulator (RES) testing***
- ***National Systems Cueing***
- ***I860's***
- ***A/D Converter***
- ***SET-15 Redesign***
- ***Array Processor Redesign***

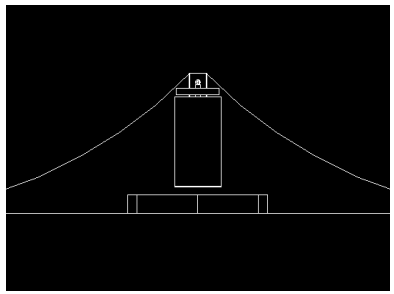
Efforts in Progress (continued)

- **Modular Azimuth Positioning System (MAPS)**
  - Phase III
    - Automatic north finding
    - Dynamic tilt sensing
- **Maintenance Lift Replacement**
  - Initiated to address severe maintenance safety deficiencies and reduce high MTTR.
    - Existing design is unreliable and precludes regular preventive maintenance when inoperable
  - Accomplishments
    - New Design Tested
    - During Anodizing of rack assembly – deformed screws found
    - Solution identified
    - ECP anticipated Aug 31, 2002

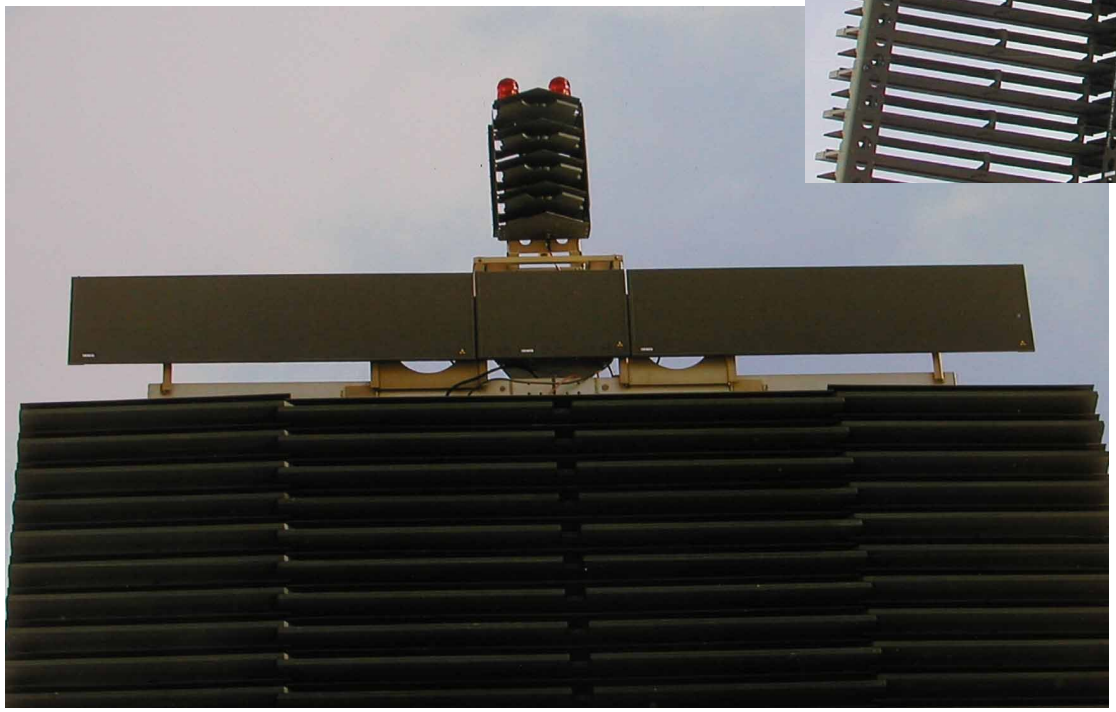
Efforts in Progress (continued)

- **IFF Antenna Replacement**
  - COSSOR Flat Plate Ant. to replace current GPA-123 .
  - Testing complete
  - Fabrication of transport containers and mounting brackets for remaining systems
  - Purchase remaining antenna and additional hardware.
  - Place second 10ft Groun al opposite I-Beam for light
  - ECP anticipated Aug 31,
  - Planned procurement FY03





COSSOR FLAT PLATE ANTENNA on a AN/TPS-59(



- Overall Array height increase from 37 ½ feet to 39 feet

Efforts in Progress (continued)

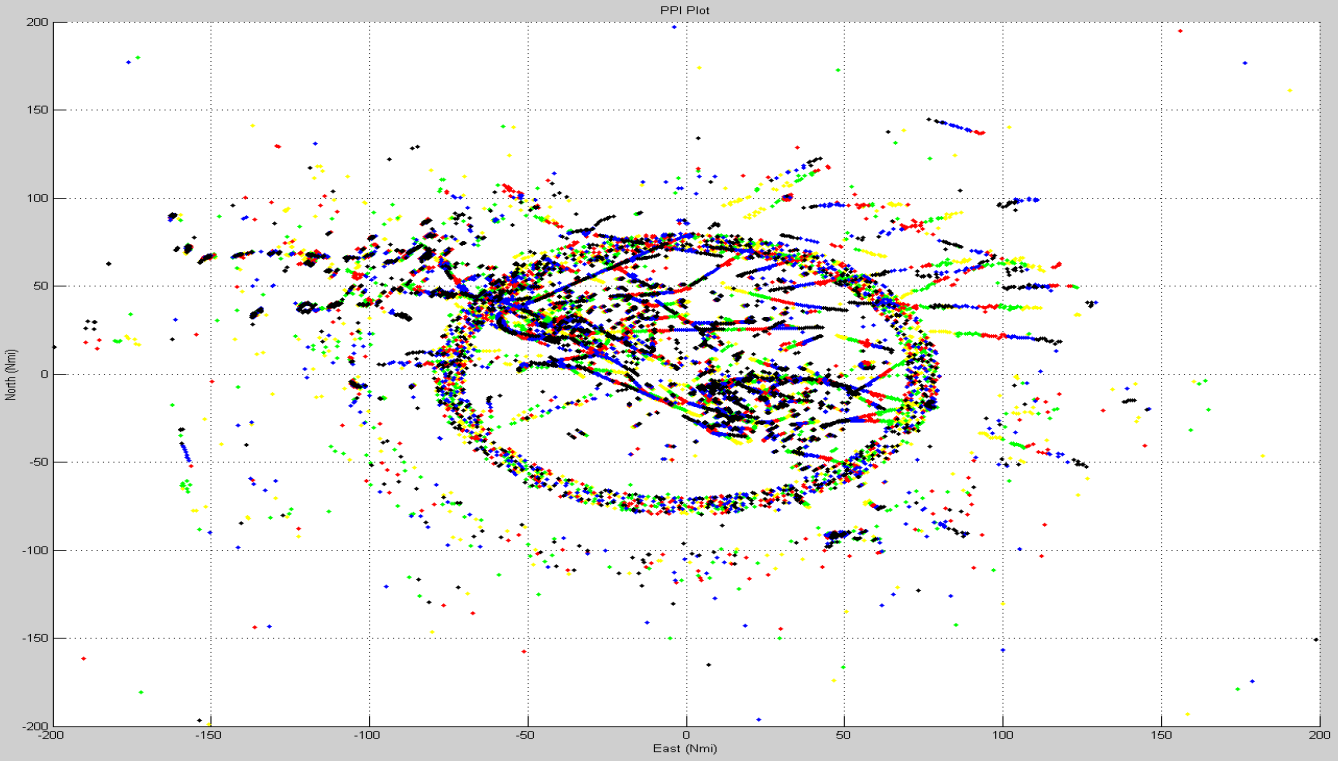
- **Composite Track Network (CTN) / Cooperative Engagement Capability (CEC)**
  - Transitioned from Sensis Corp. to Lockheed Martin Corp.
  - CTN transitioned to AN/TPS-59(V)3 Power PC-based thread
  - Continued Developmental Testing efforts scheduled at MACS-24
  - PECP planned for 4th Qtr FY02
  - ECP planned for FY03

Efforts in Progress (continued)

- **False Alarm Reduction (FAR)**
  - MANUAL FAR capability:
    - **Tested June 02**
    - Applies operator selectable database changes (templates, clutter map, TBM thresholds)
    - Has demonstrated 40-50% reduction in radar clutter
    - Real world analysis of manual FAR shows ~55% decrease in clutter
    - Fielding planned for 1st QTR FY-03
    - Final FAR certification, verification and validation testing forthcoming
    - ABT 10, ABT 5, CMB, CMB reduced templates
      - Training (on location)
  - AUTOMATED FAR will sample environment and automatically implement the FAR algorithm as clutter is detected. This capability will further reduce number of FA reported by USMC TBMD systems.
    - Planned for FY04

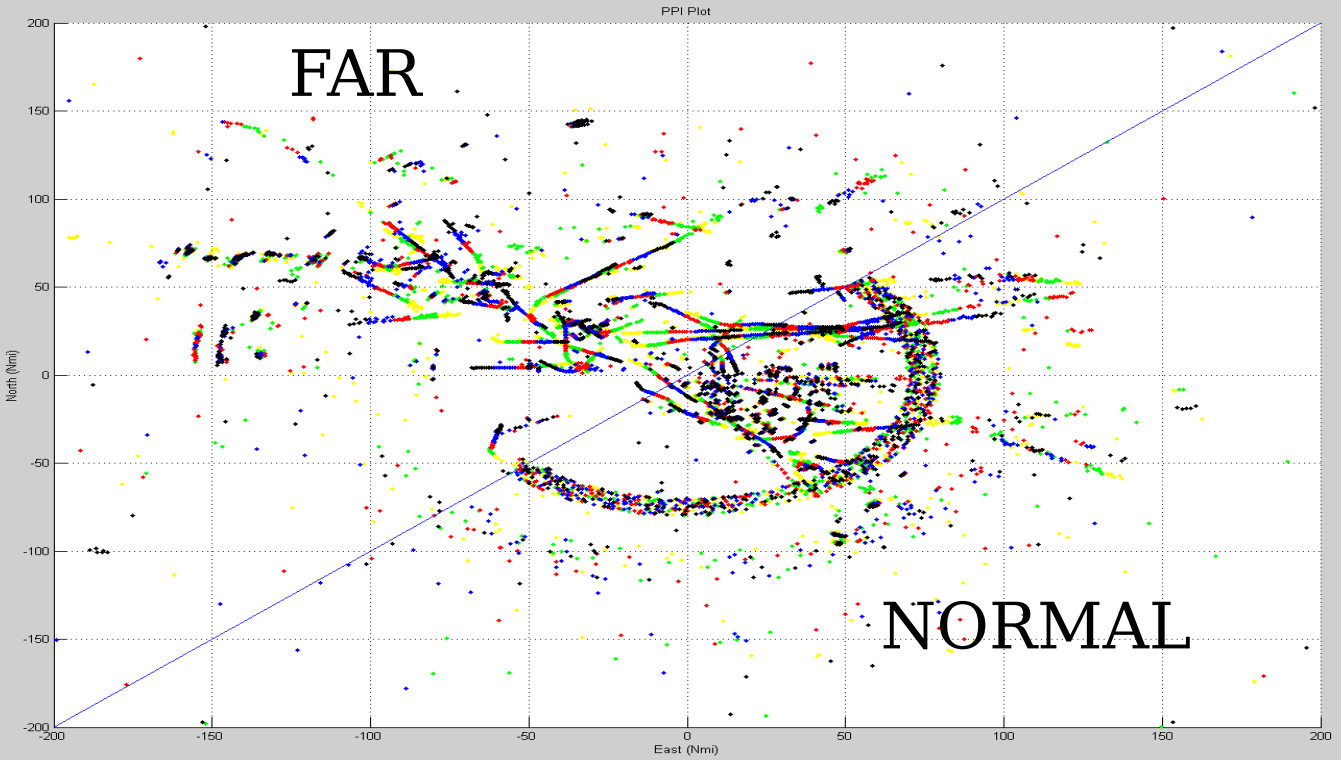
ABT5 Mode 6/1/02

Normal 360 degrees
Search and Reinforced Targets



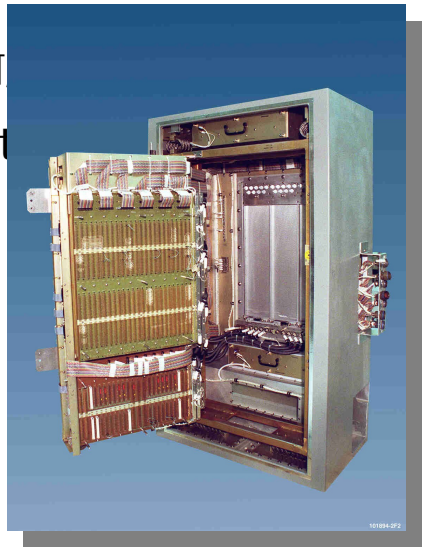
ABT5 Mode 6/1/02

FAR 225 – 45, Normal 45 – 225,
Search & Reinforced Targets



Efforts in Progress (continued)

- **Post Detection Processor Upgrade**
  - Transition from Nighthawk to Powerhawk processor
  - PH 640 end of life notice = migration to PH 720 Processor
  - 720 Processor
    - Alleviate two obsolete boards
      - Motorola 68040 & Condor Board used for CTN
    - Increased connectivity (RS232 and Either Net
  - Planned procurement F



Efforts in Progress (continued)

- **Precision Lightweight Global Positioning System Receiver (PLGR) replacement**
  - Identified a replacement for Single-Point of Failure for system clock
  - VME circuit card which is TPS-59 compatible
    - Zyfer CommSyncII
      - UPS back-up
  - Planned procurement FY03
- **Mission Planner**
  - Software tool utilized to employ the radar for both ABT and TBM missions
  - Will maximize capabilities of radars for the MACS and assist in the siting of all current and future radar assets
  - Delivery 1st Quarter FY04

Efforts in Progress (continued)

- **Low Earth Orbit Satellites (LEOS) (Data Registration)**
  - NAVSEA 53 sponsored initiative to determine and characterize Data Registration problems that create shortfalls within the SIAP
  - Demonstrate the capability of alignment algorithm(s) to accurately align two and three dimensional sensors by using Link-16 PPLI messages and other geodetic referenced targets.
  - LEOS Alignment of Sensors (AOS) provides a more accurate, absolute alignment of radar, which will give a higher accuracy target position and increase the Probability of Kill.
    - Proof of concept shows usefulness
    - Phase II, manual capability implementation

Efforts in Progress (continued)

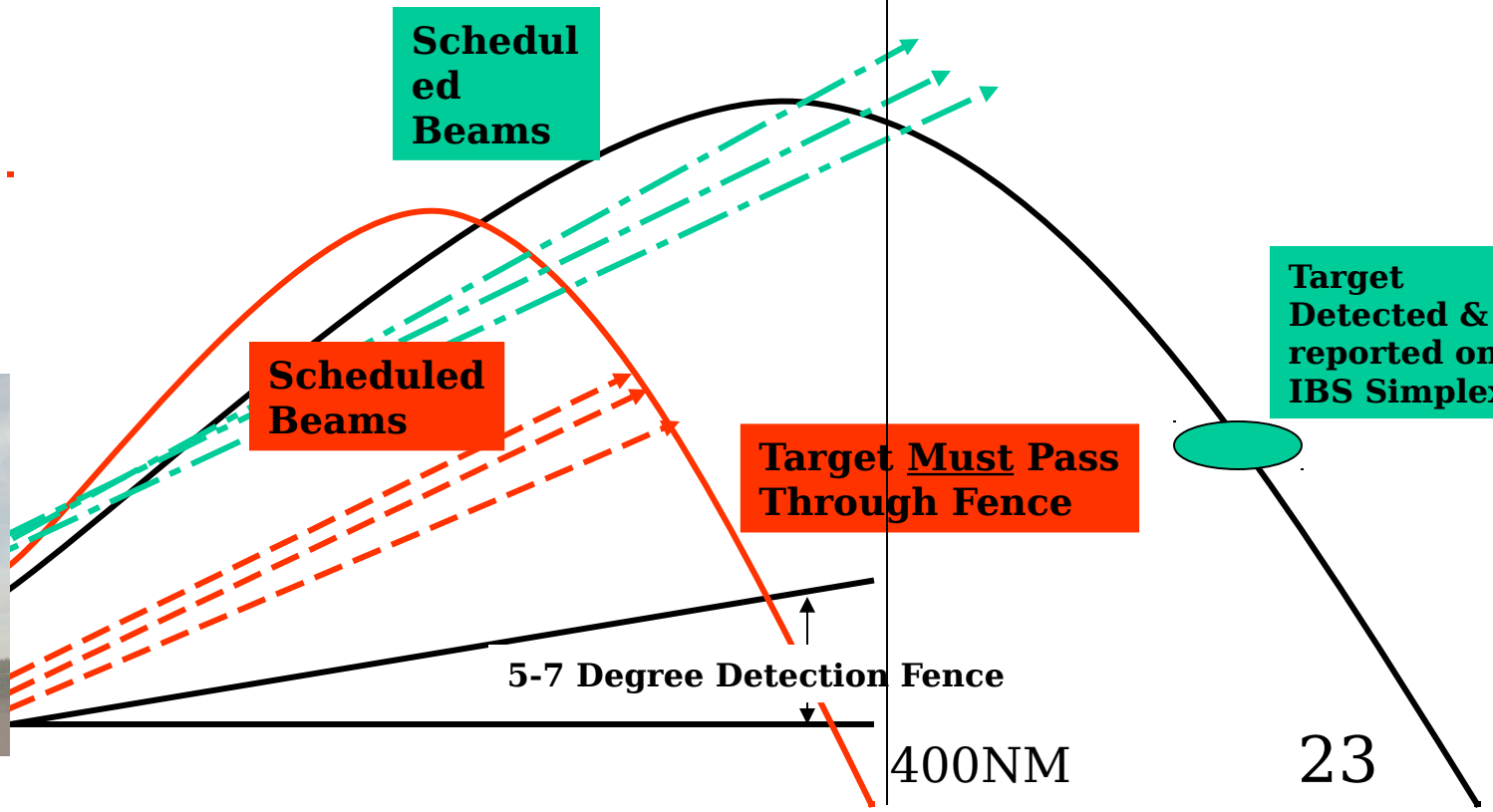
- **Radar Environmental Simulator**
  - Total quantity of 5 procured (3 MCTSSA, 1 LMC, 1 Sensis)
  - Efforts for FY03
    - Regression testing – 3rd Qtr
    - Obsolescence review – 1st Qtr
    - Repair and Return stop gap - Immediate
    - Life Cycle Support Contract – 2nd Qtr
  - Potential efforts
    - RES Maintenance Training
    - RES III Development

Efforts in Progress (continued)

- **TPS-59 Radar Overhead Cue Capability**
  - Built off of previously developed Pacific Blitz Backbone
  - Overhead cue capability allows for longer range cue.
    - No line of site TADIL-J Limitations
    - Allows TPS-59 to be an In-Theater Stand-alone platform
    - Allows for Early Detection and Reporting of Long Range TBM (Outside normal TPS-59 detection range)
  - 3 Phase process
    - Phase 1 Concept Exploration
      - Sensis lab demonstration validated the potential of the design & algorithms.
    - Phase 2 Capability Validation
      - HWILT Participation
        - Validated ability to receive and process TDDS cue from JTAGS

TPS-59 Overhead Cue

Detect, Track, an
Report TBM on J



Efforts in Progress (continued)

- I860's
  - Mercury board upgrade to PDP
  - Albany purchased 12 boards.

- A/D Converters
  - Sensis in process of redesigning.
  - Estimated completion, end of August
    - Testing and production

- Array Processor Redesign
  - ECP

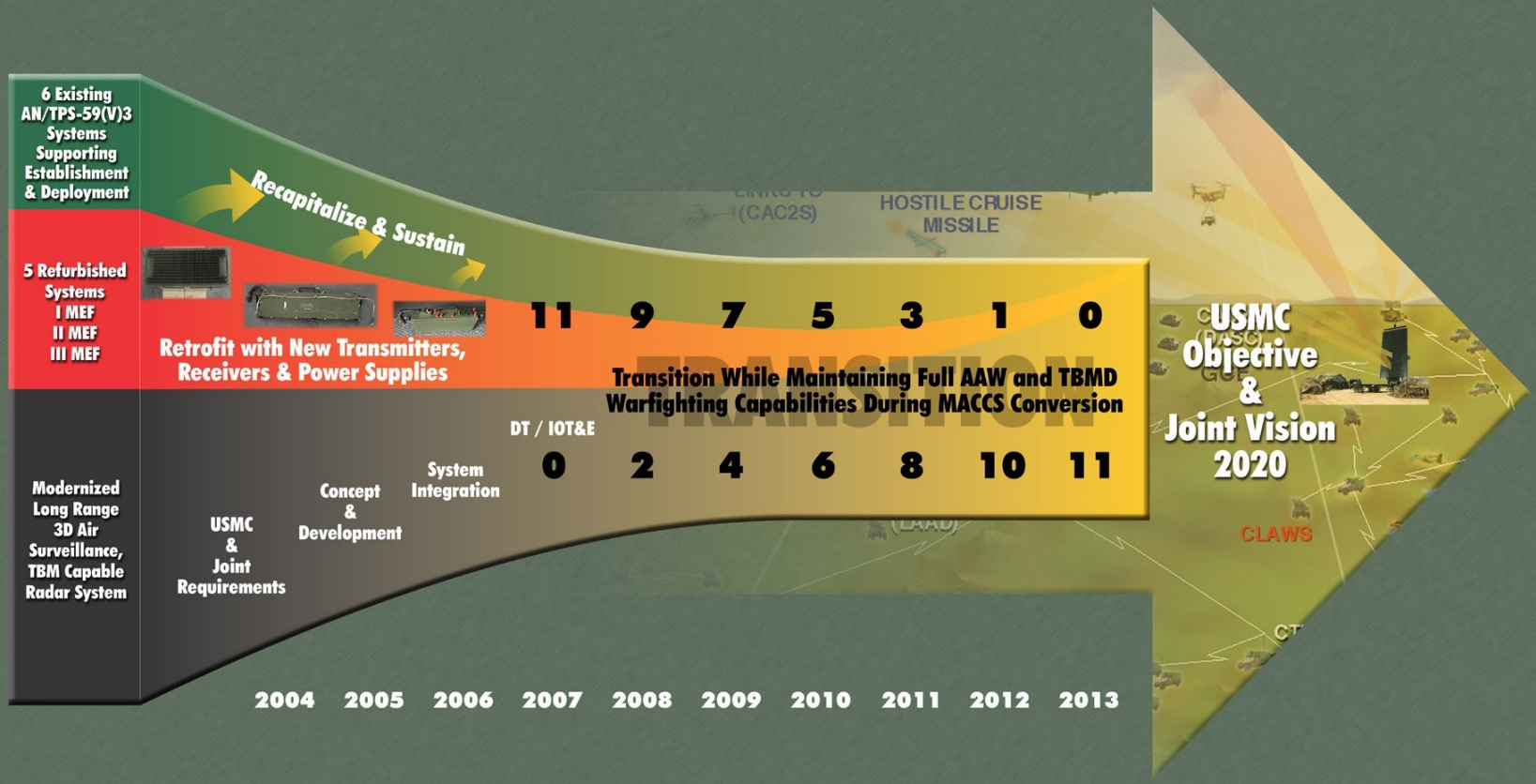
Significant Recent Accomplishments (continued)

- **Program Objective Memorandum (POM) 04**

Two Phased approach:

- **Service Life Extension Program (SLEP):**
  - Address operational equipment readiness deficiencies
  - 5 of the 11 systems will be sustained
  - Sustainment offers:
    - Current technology
    - Equipment readiness
    - Extend the overall system life cycle
    - Reduce operating cost
- **Modernization (Mobility):**
  - Encompass all 11 radar systems within the Marine Corps inventory
  - Commence in FY04
  - IOC FY08
  - FOC FY13

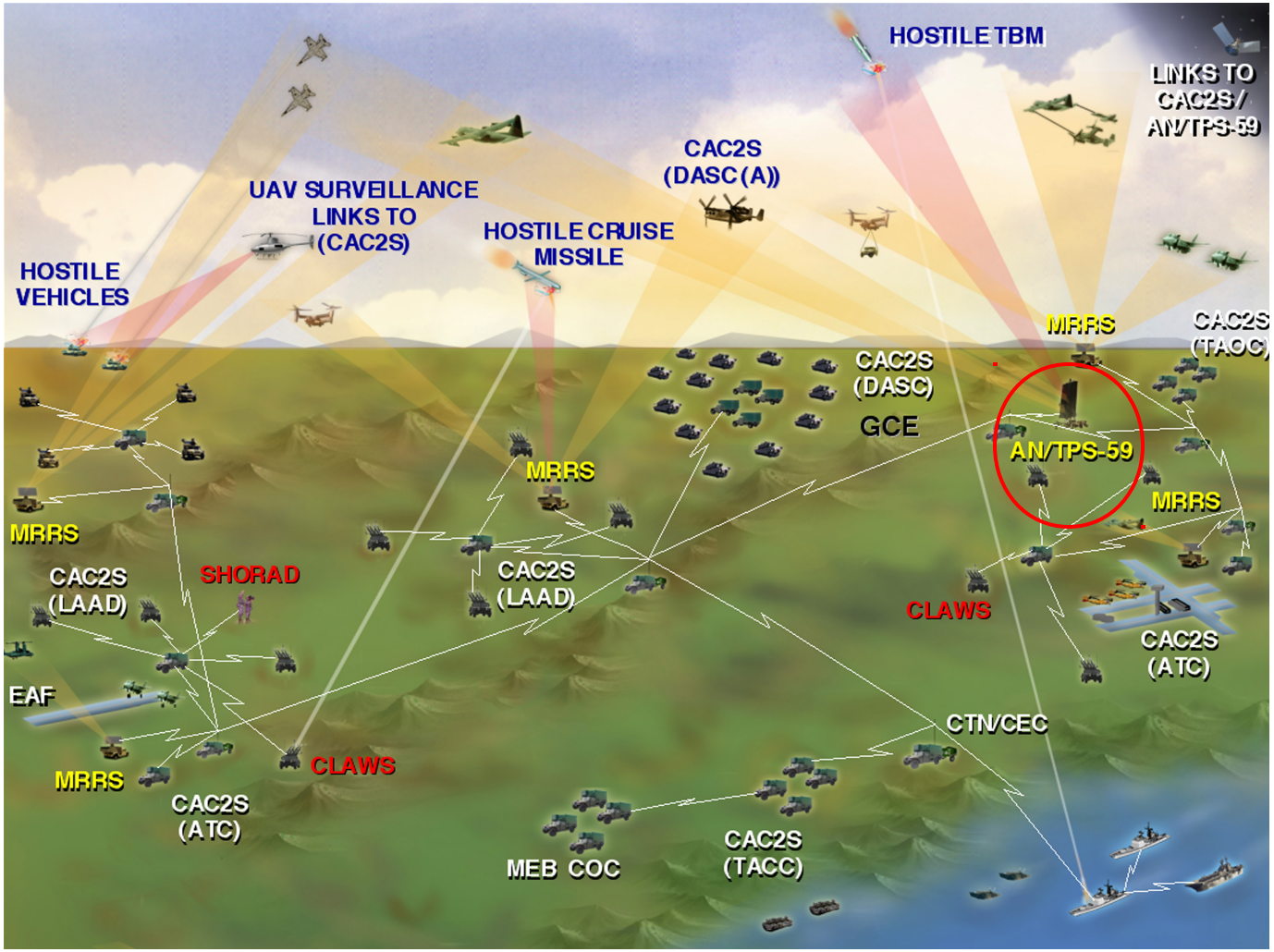
United States Marine Corps' Long Range Air Surveillance Sensor Strategy


6 Existing AN/TPS-59(V)3 Systems Supporting Establishment & Deployment
5 Refurbished Systems I MEF II MEF III MEF
Modernized Long Range 3D Air Surveillance, TBM Capable Radar System
Recapitalize & Sustain
Retrofit with New Transmitters, Receivers & Power Supplies
TRANSITION
Transition While Maintaining Full AAW and TBMD Warfighting Capabilities During MACCS Conversion
USMC & Joint Requirements
Concept & Development
System Integration
DT / IOT&E
0 2 4 6 8 10 11
11 9 7 5 3 1 0
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
USMC Objective & Joint Vision 2020
HOSTILE CRUISE MISSILE
CLAWS

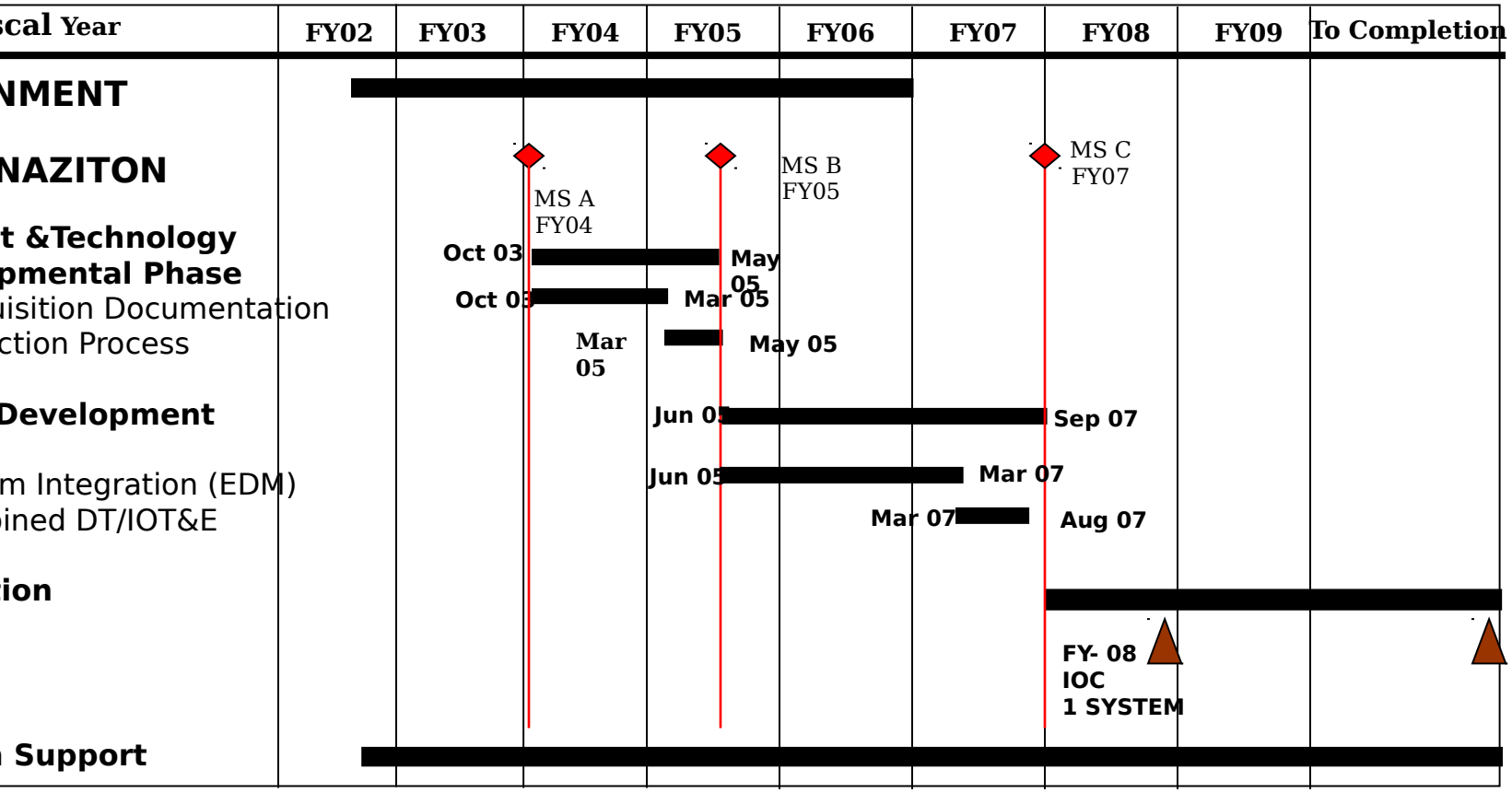
INCREASING WARFIGHTER CAPABILITIES THROUGH MODERNIZATION AND MOBILITY ENHANCEMENTS WHILE MAINTAINING FLEET READINESS!

How We Get There

MACCS MEB Capability



Long Range Sensors Program Schedule



QUESTIONS?